CLAIMS

- 1. A process for the selective hydrogenation of at least one diolefinic compound contained in a feed, comprising the passage of a feed containing at least one diolefinic compound in contact with a catalyst composition, characterized in that said catalyst composition comprises at least one salt of a transition metal from groups IB, IIB, VB, VIB, VIIB and VIII of the periodic table, at least one ligand and at least one organometallic reducing agent.
- 2. A process according to claim 1, characterized in that:

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- the transition metal salt is selected from halides, acetylacetonates and carboxylates of organic acids containing 2 to 25 carbon atoms;
- the reducing agent is selected from organometallic derivatives of at least one metal selected from the group formed by lithium, sodium and aluminium;
- the ligand is selected from derivatives of phosphorus, arsenic and antimony and nitrogen-containing ligands.
- 3. A process according to claim 2, characterized in that the carboxylate is selected from acetates, octoates, decanoates, naphthenates, stearates, palmitates, oleates and benzoates.
 - 4. A process according to one of claims 1 to 3, characterized in that the transition metal salt is selected from salts of metals from groups IB, IIB, VIB and VIII of the periodic table.
 - 5. A process according to claim 4, characterized in that the transition metal salt is selected from copper, zinc, chromium, molybdenum, iron, cobalt, nickel, ruthenium and palladium salts.
 - 6. A process according to claim 5, characterized in that the transition metal salt is selected from iron salts.

- 7. A process according to one of claims 1 to 6, characterized in that the reactor is selected from:
 - organoaluminas with general formula $AlR_y(X)_{3-y}$, in which R is an alkyl group, X is a halide and y=1, 2 or 3;
 - magnesias with formula MgR₂, in which R is as defined above;
 - aluminoxanes;

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- sodium borohydride; and
- alkaline hydrides and their substitution derivatives comprising 1, 2 or 3 alkoxy groups.
- 8. A process according to one of claims 1 to 7, characterized in that the ligand derived from phosphorus, arsenic or antimony is selected from ligands with general formulae:

 YR_mX_{3-m} , YR_3 , R_2Y - $(CH_2)_nYR_2$, $Y(OR)_3$ and YOR_3 ,

in which Y=P, As or Sb, m=0, 1, 2 or 3; R = alkyl, aryl or substituted aryl; X = halogen, and n=0, 1, 2, 3 or 4.

- 9. A process according to one of claims 1 to 7, characterized in that the nitrogencontaining ligand is selected from amines, polyamines, imidazole, substituted imidazoles, pyrrole, substituted pyrroles, pyrazoles, amide derivatives, imines, diimines and pyridine derivatives.
 - 10. A process according to one of claims 1 to 9 characterized in that a minor proportion of at least one salt of a further transition metal selected from metals from groups IB, VB, VIB, VIIB and VIII is added to the catalyst.
 - 11. A process according to claim 10, characterized in that the principal metal is iron and the additional metal is selected from Co, Ni, Cu, Rh, Pd, Mn, Mo, W and V.
- 12. A process according to one of claims 1 to 11, characterized in that it is dissolved in at least one organic compound selected from aliphatic or aromatic hydrocarbons, ethers, esters, halogenated hydrocarbons, sulphoxides and amides.

- 13. A process according to one of claims 1 to 11, characterized in that it is dissolved in at least one ionic liquid with general formula Q⁺ A⁻ in which Q⁺ represents a quaternary ammonium and/or quaternary phosphonium ion and A⁻ represents any anion which is capable of forming a liquid salt at low temperatures, i.e. below 90°C.
- 14. A process according to claim 13, characterized in that the quaternary ammonium and/or phosphonium ion Q⁺ has one of the following general formulae:

$$NR^1R^2R^3R^{4+}$$
 and $PR^1R^2R^3R^{4+}$

or one of general formulae:

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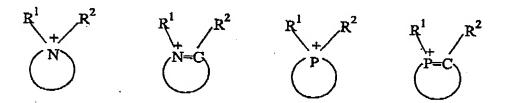
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$$R^{1}R^{2}N=CR^{3}R^{4+}$$
 and $R^{1}R^{2}P=CR^{3}R^{4+}$

in which R¹, R², R³ and R⁴, which may be identical or different, each represent hydrogen, the cation NH₄⁺ being excluded for NR¹R²R³R⁴⁺, or a hydrocarbyl residue containing 1 to 30 carbon atoms.

15. A process according to claim 13, characterized in that the quaternary ammonium and/or phosphonium ion Q⁺ derives from a nitrogen-containing or phosphorus-containing heterocycle comprising 1, 2 or 3 nitrogen or phosphorus atoms, having one of the following general formulae:



in which the cycles are constituted by 4 to 10 atoms and R¹ and R², which may be identical or different, each represent hydrogen or a hydrocarbyl residue containing 1 to 30 carbon atoms.

16. A process according to claim 13, characterized in that the quaternary ammonium and/or phosphonium ion has one of the following formulae:

$$R^{1}R^{2+}N=CR^{3}-R^{5}-R^{3}C=N^{+}R^{1}R^{2}$$
 or

$R^{1}R^{2+}P = CR^{3}-R^{5}-R^{3}C = P^{+}R^{1}R^{2}$

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in which R¹, R² and R³, which may be identical or different, each represent hydrogen or a hydrocarbyl residue containing 1 to 30 carbon atoms and R⁵ represents an alkylene or phenylene residue.

- 5 17. A process according to one of claims 1 to 16, characterized in that the mole ratio between the ligand and the transition metal salt is in the range 0.5/1 to 10/1.
 - 18. A process according to one of claims 1 to 16, characterized in that the ligand is monocoordinating and the ligand/transition metal salt mole ratio is 2/1 to 3/1.
 - 19. A process according to one of claims 1 to 17, characterized in that the ligand is bicoordinating and the ligand/transition metal salt mole ratio is 1/1 to 1.5/1.
 - 20. A process according to one of claims 1 to 18, characterized in that the mole ratio between the reducing agent and the transition metal salt is 1/1 to 15/1.
 - 21. A process according to one of claims 1 to 20, characterized in that said catalyst composition is employed in a proportion corresponding to a proportion of metallic compounds in the reaction medium of 10 to 10000 ppm by weight.
 - 22. A process according to one of claims 1 to 21, characterized in that said feed is a C₄ cut comprising 1,3-butadiene.
 - 23. An integrated process for producing 1-butene from a 1-butene rich C₄ cut, characterized in that it comprises, as the finishing step, selective hydrogenation of 1,3-butadiene carried out using a process according to claim 22 to obtain a 1,3-butadiene content of less than 10 ppm by weight.